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**(57) Abstract:**
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# Transport container

The invention concerns a transport container, particularly a transport container of the stacking type for pharmaceutical products, in accordance with the preamble of claim 1.

Such transport containers are used in particular to store and commission medication, bandaging material, drugs and cosmetics or similar at the manufacturer's facility and to supply these materials from there and by way of transport or parcel services to wholesalers, to then supply these materials from there and by way of distributors or distribution facilities to the respective sales facilities, i.e., pharmacies, drug stores, end users and particularly clinics. Furthermore, such containers are used to intermediately store or stockpile the above-mentioned goods at the distributor.

A designation of these containers is thus necessary and may even be stipulated for various reasons. During handling, such containers are tightly closed with a cover that must be removed to determine the container content. This is made more difficult by the fact that several of these containers are generally stacked on top of each other and the cover can be removed only after restacking the containers. Accordingly, it is generally necessary to indicate or declare the respective content on an adhesive label or similar placed on the outside of the container.

When the distributor uses such containers to intermediately store or stockpile pharmaceutical goods or similar and when individual lots consisting of several such containers are prepared for individual customers such as pharmacies, drug stores or similar, he will use containers that serve as intermediate storage and he will remove the respective quantity of goods from them.

It is only natural that a manual designation of the containers or a manual description of the content on labels or similar placed on the container is subject to spelling errors, carelessness or deliberate incorrect descriptions and this would lead to errors and cause serious problems when accepting and stockpiling the goods. It is possible, for example, that an individually prepared delivery ordered by a pharmacy will be incomplete. This may force the courier to return to the distributor and then back to the pharmacy.

An attempt has already been made to remedy these problems by placing machine-readable designations, such as so-called line or bar codes on the transport container. Although such bar codes solve the problem of spelling errors, one is still faced with problems or errors such as an incorrect reading of these bar codes due to soiled or damaged containers or similar. Furthermore, the drugs supplied by the pharmaceutical industry and packaged in the transport containers are placed on conveyors, roller tables or similar during the receiving process at the distributor or intermediary merchant, and are sorted manually and/or automatically according to their labels and/or codes and the orders at hand. Particularly machine-readable codes such as bar codes are subject to reading errors due to vibrations that are caused by the conveyor or roller table and affect the whole transport container and thus also the bar codes placed on it; accordingly, stationary reading units installed along the conveyor or roller table have difficulties correctly scanning the vibrating passing code.

Furthermore, a method is known for recognizing or identifying an object in an inductive manner, i.e., using magnet technology. Among other disadvantages, this system requires a high technical effort and is subject to failures, particularly under rough operating conditions.
A new system for recognizing and identifying objects was developed recently. It consists of so-called transponders that are also known as passive high-frequency identification storage systems. Transponders are designed as EEPROM (electrically erasable and programmable read-only memory) data storage units that have several advantages over optical and magnetic identification units. Among other advantages, it has a large memory capacity, it can be used in operational environments not suited for optical and/or magnetic systems and it has a small size. Transponders are very reliable in dirty and dusty operating conditions, in hot and cold applications, when there is low or no visibility, in applications with much humidity and vibrations, and they function almost independent of their position. The data stored in the transponder's EEPROM can be retrieved with an external read-write device, in which case the energy required to operate the transponder is taken from the sending output of the write-read device. For that reason, transponder modules have a practically unlimited service life, since the operation of a transponder does not require a battery or similar.

A method is already known for equipping the so-called Euro-pallets with such transponders. In this system, data relating to the Euro-pallets are permanently stored in the respective transponders, e.g., a current number and the company number or similar of the pallet owner. Such uncomplicated data can be ordered from and permanently programmed by the transponder manufacturer at its facility.

Using an appropriate reading device, it is thus possible to request the pallet-specific data and to include them in the freight documents, for example. With the use of a respective computer system, it is possible to better track a pallet. However, and as before, the material placed on the pallet is identified visually and/or with the freight documents.

When using transponders, it is necessary to ensure that two such transponder modules are not located too close to each other when reading or writing the data stored in the transponder module, since this could lead to reading and/or transmitting errors due to an inductive disturbance, in which case one of the transponder modules may disturb the reading or writing process at the other transponder module. Generally, this problem does not exist with Euro-pallets, since their relatively large size alone makes it highly unlikely that transponders installed in two adjacent pallets will come too close to each other. Furthermore, it is no problem to install the transponder on the inside of the pallet, thus making it impossible for the two transponders to come too close in the case of these pallets. "Too close" means that two adjacent transponders are located closer than approx. 20 cm from each other.

This interference liability or inductive disturbance between two closely adjacent transponders is the very problem that makes the use of transponders in so-called nesting pack boxes for pharmaceutical applications much more difficult. Such nesting pack boxes are substantially smaller than Euro-pallets, thus increasing the probability that transponders installed in two immediately adjacent boxes may have a disturbing effect on each other. Furthermore, such boxes pass through a read and/or distribution station at the distributor, i.e., generally on a conveyor, similarly arranged one after another or in close succession. Accordingly, the boxes are in a relatively close proximity to each other during the reading of the data stored in the transponder and this increases the risk of read and/or write errors. These errors could be prevented, however, by installing the transponder at the

bottom center of the box; not only is this difficult with respect to construction and manufacture, prone to damage and reduction in the available volume, this also increases the interference liability from products or their aluminum packaging arranged above the transponder.

This problem is generally not found with Euro-pallets, since these do not pass one after another through a read device but are handled individually with respective industrial trucks or lifting devices, in which case the data stored in the transponder of the individual pallet can be read without problems when transporting or lifting the individual pallet.

Finally, the transponders that are permanently preprogrammed with specific data by the manufacturer are not very well suited for use in nesting pack boxes for pharmaceutical applications, since identification of the constantly changing container content is impossible with such permanently preprogrammed transponders. Fixed data such as container number or container origin can be permanently stored in the transponder; however, the constantly changing data about container content must be designated again, possibly by way of a label to be marked, in which case the safe distance of labels that have become unusable represents a great problem.

In contrast to the above, the task of this invention consists in the development of a transport container according to the preamble of claim 1, in such a manner that it permits fast and problem-free identification of the transport container as well as of its content.

According to the invention, this task is solved with the features indicated in claim 1.

A transport container in accordance with the invention is characterized by a freely programmable transponder that is arranged in an edge strip of a longitudinal side of the transport container, i.e., adjacent to, yet at a distance from, a corner of the transport container.

The installation of a freely programmable transponder provides the possibility to freely program - in addition to fixed data provided by the manufacturer such as current number or similar - other data and to revise or delete them when necessary, in which case data access can be restricted to a certain authorized group of persons by way of pass codes or passwords. In addition to the permanently programmed number that alone may be sufficient to identify the transport container, it is now possible to identify or declare, by way of the respective container transponder, the transport container content that constantly changes with respect to quantity and composition. The installation of the transponder in an edge strip at the longitudinal side of the transport container and adjacent to, yet at a distance from, a corner of the transport container ensures a sufficient gap between two adjacent transponders for transport containers located side-by-side on a conveyor or similar, thus permitting problem-free reading and/or writing of the respective transponder data with a stationary or portable write-read device. This gap is maintained in a quasi-automatic manner by the fact that the contact between lateral and/or front sides of adjacent transport containers or of transport containers arranged side-by-side or on top of each other determines the minimum spacing that can be reached between two transponders. By arranging the transponders correspondingly, these minimum gaps can be set to achieve a problem-free transponder operation. Accordingly, there is no need to install the transponder at the bottom with the associated disadvantages. The additional advantage of almost undisturbed sending and receiving transponder characteristics is also obtained.

The sub-claims list further advantageous developments of the invention.

When the edge strip formed at the transport container is open at the bottom, the transponder can be pushed from the open bottom side into the edge strip. Accordingly, transponder installation at the transport container, replacement of a damaged transponder with a new one or fitting or retrofitting the transport container with another transponder type is thus possible without problems. Just as well, the edge strip may form a closed hollow section, in which case the transponder can be pushed through a lateral opening in the hollow section. In addition to the advantage of a simple transponder arrangement at the container similar to that at an edge strip with an open bottom, this advantageous transport container design exhibits the advantage that a transponder arranged at the container is fully enclosed by the edge strip and thus fully protected from damage.

In a preferred manner, the gap between the longitudinal center axis of the transponder and the usable inside volume of the transport container shall not be less than 7 mm. Particularly in the case of transport containers used for pharmaceutical products, this prevents aluminum-containing blister packaging or drug packaging or aluminum cans of any type located in the inside transport volume from disturbing the data transfer from and to the transponder.

Furthermore and in the vertical direction, the transponder should not be located too far from the top edge of the edge strip; otherwise, blister or drug packaging located in the inside volume could again disturb the data transfer. In a preferred manner, the gap between the top edge of the edge strip and the longitudinal center axis of the transponder shall not exceed 7.5 mm.

In a preferred manner, two or more transport containers in accordance with the invention can be partly nested into each other and can thus be stacked. This is particularly advantageous for the stockpiling and returning of empty transport containers. In that respect, the gap between the longitudinal center axis of transponders installed in two immediately adjacent stacked transport containers shall vary preferably between a minimum of 40 mm and approximately 100 mm; the preferred gap is approximately 70 mm. Accordingly and without any disturbances or effects between adjacent transponders, it is possible to retrieve, delete or rewrite data stored in transponders of transport containers that may even be stacked.

In a preferred manner, the front of the transponder pointing in the direction of its adjacent corner shall be located a minimum of 18 mm from this adjacent corner or the extension of the adjacent cross sides of the transport container. In that manner, it is possible to retrieve, delete or rewrite on the respective transponders without any mutual disturbing effect between adjacent transponders, i.e., even when the transport containers are stacked. Even for transport containers arranged one after another on a conveyor, for example, this produces a sufficient safety gap between the transponders installed in two adjacent containers, thus permitting a read or write process without disturbance.

In a preferred manner, the transport container in accordance with the invention has a rectangular footprint, in which case the transponder is arranged at a longitudinal side. On a properly sized conveyor or roller table, transport containers with a rectangular footprint are transported such that one of the smaller sides points in the transport direction. Accordingly, a transponder arranged at one

of the longitudinal sides is located laterally at the transport container to be conveyed and the gap between transponders installed in the longitudinal sides will be sufficient for transport containers with touching shorter sides to operate them trouble-free with radio waves and with antennas arranged in a staggered manner on both conveyor sides.

It may also be advantageous to provide several transponders at the transport containers. It is possible, for example, to supplement the freely programmable transponder with a transponder that was permanently programmed at the facility and that stores only permanent data such as serial number, branch or owner of the transport container, while the freely programmable transponder serves only to identify or list the changing container content.

Further details, aspects and advantages of this invention can be obtained from the following description that makes reference to the drawings.

The drawings show the following:

Figure 1 shows a three-dimensional view of a design form of the transport container in accordance with the invention;

Figure 2 shows a bottom view of the edge strip of the container shown in Figure 1;

Figures 3A and 3B show a section along line III indicated in Figure 2, in which case Figure 3A shows a first design form and Figure 3B a second design form;

Figure 4 shows a lateral section through the container shown in Figure 1;

Figure 5 shows a section through two containers that were partly nested and are thus stacked; and

Figure 6A through 6C shows schematic top views of transport containers that are manufactured in accordance with the invention and are located on a conveyor, in which case the transport containers are located differently in relation to each other.

Figure 1 shows a three-dimensional view of a possible design form for a transport container in accordance with the invention. The transport container designated as "2" for the whole unit exhibits the box-like form shown in Figure 1 with a rectangular floor 4 and basically vertical longitudinal sides 6 and 8 and front sides 10 and 12 that point upwards and start at the floor. As shown in Figure 1 and particularly in Figure 4, longitudinal sides 6 and 8, as well as front sides 10 and 12, slope inward in an almost uniform manner and in steps from the container's top edge to floor 4, in which case the inward sloping sections exhibit almost equal side heights. Accordingly, each longitudinal side 6 or 8 as well as each front side 10 or 12 has area or side sections 6a, 6b, 6c or 8a, 8b, 8c and 10a, 10b, 10c or 12a, 12b, 12c. In this regard, a lateral side edge strip 14 with collar runs between side sections designated as "a" and those designated as "b". The top peripheral edge of the transport container is formed as peripheral edge strip 16.

As shown in Figure 1, front side 12 has a recess that can be closed with appropriate side insert 18 that is suspended in the area of edge strip 16. According to Figure 4, the top side of transport container 2 can be closed with cover 20, that in this design sample consists of two wings with hinge 22, and can be closed at front sides 10 and 12 using locally formed locking recesses 24.

Figure 5 shows the manner in which three transport containers 2 are partly nested into each other and are thus stacked. In that regard, lateral side receiving strip 14 of top transport container 2 rests on edge strip 16 of transport container 2 located immediately below it. This determines the nesting depth of the respective transport container 2.

According to Figures 3A, 4 and 5, edge strip 16 may be open at the bottom, i.e., its cross-section basically forms a reversed letter "U". As an alternative, edge strip 16 may consist of a closed hollow section, i.e., possibly with a cross-section of a closed circle. When the bottom side of edge strip 16 is open as shown in Figures 3A, 4 and 5, edge strip 16 simultaneously serves as a handle for the better handling of transport container 2 or of several such transport containers when stacked, i.e., in addition to serving as reinforcement for the free top edge of transport container 2. Furthermore, edge strip 16 serves to clamp in reflex foil carriers, freight documents, warnings or similar or to automatically lift the containers with handling equipment in connection with cover 20 to achieve a spray-water-proof and dust-proof cover for container 2.

Figure 2 shows a bottom view of edge strip 16 in the area of left rear corner 26 of transport container 2 as shown in Figure 1. Distributed in the longitudinal direction of the continuous edge strip 16 are several stiffeners 28 that connect and stiffen the two free legs of the reversed "U" forming the cross-section of the edge strip and thus improve the overall stiffness of edge strip 16. As can be seen best by looking at Figures 2, 3A and 3B, recess opening 30 for receiving transponder 32 is formed in the area of longitudinal side wall 8 of transport container 2.

Transponder 32 may consist of the model RI-TRP-RB2B that is marketed by the firm Texas Instruments under the trade name TIRIS. This transponder is shaped like a pin and its outside dimensions are: Length 32.5 mm /Diameter 3.85 mm; accordingly, its small size and its pin shape make it perfectly suitable to be pushed into receiving area 30 from the open bottom side of edge strip 16. In a preferred manner, transponder 32 is pushed into silicon hose 34 to protect it better against blows and impact. According to Figure 3A, the attachment of transponder 32 in receiving area 30 is achieved with suitably designed and flexible attachment clamps 36 that snap into place to hold transponder 32. As an alternative, transponder 32 can be held in place in the receiving area with the help of an adhesive connection; it can also be cast into receiving area 30.

When the cross-section of edge strip 16 consists of a closed hollow section, i.e., the bottom side is not open as shown in Figure 3A to insert transponder 32 in receiving area 30, transponder 32 is installed in the closed hollow section as indicated in Figure 3B. A hole is drilled in the area of corner 26 through the hollow section of edge strip 16 and transponder 32 is subsequently inserted through this hole into the adjacent receiving area 30. The hole is then closed in the area of corner 26 with a plug or with liquid synthetic resin or similar.

In any case, and after inserting and placing it in receiving area 30, transponder 32 is arranged adjacent to, yet at a distance from, corner 26 of transport container 2. In a preferred manner, the transponder front pointing in the direction of its adjacent corner 26 should be located at a distance of at least 18 mm from this adjacent corner 26 or from the extension of the adjacent cross sides of the transport container or from the plane of front side 12 adjacent to longitudinal side 8. The reason for this will be explained with reference to Figures 6a through 6c.

With respect to more accurate technical data for the transponder of the type RI-TRP-RB2B as well as appropriate read devices and antennas, reference is hereby made explicitly to the respective data sheet 10-09-002 (02/92) issued by the manufacturer.

As shown in Figure 3A or 3B, transponder 32 is not installed at the center of the reversed U-section of edge strip 16. This is done to maintain a gap of at least 7 mm between the longitudinal center axis of transponder 32 and the usable inside volume of transport container 38. It was found that - particularly in the case of pharmaceutical goods to be transported in transport container 2 - the sometimes high metal content of pharmaceutical packaging, i.e., aluminum-containing blister packs for tablets, metal cans, ointment tubes etc. have a disturbing effect on transponder 32 when it is located too close to such metals. However, practical experience has shown that a safety gap of at least 7 mm is sufficient to ensure trouble-free data transfer between transponder 32 and an external write/read device. Furthermore, transponder 32 should not be located too far away in the vertical direction from the top horizontal edge of edge strip 16, since the data transfer could otherwise also be disturbed by material located in inside volume 38. The preferred maximum gap between the top edge of edge strip 16 and the longitudinal center axis is 7.5 mm.

Figures 6A through 6C show the manner in which several transport containers 2 in accordance with the invention can be moved on conveyor 40 in the direction of the arrow. Two antennas 42 and 42' are arranged on the left and right side of conveyor 40 in the movement path of transport container 2 to read data stored on the respective transponders 32. In that regard and as shown in Figures 6A through 6C, the gap between antennas 42 and 42' should not be less than approximately 160 mm as measured between the transponder fronts that face each other. As will be explained in reference to Figure 6C, this gap is required to ensure that a sufficient distance exists between transponders 32 installed in adjacent transport containers 2 in the case of a certain arrangement of two transport containers.

Figure 6A shows the case in which each of transport containers 2 placed on conveyor 40 one after another is arranged in the same way, i.e., transponders 32 are located on the right side as seen in the transport direction and are scanned by antenna 42. A sufficient gap T between two adjacent transponders 32 is thus ensured in any scenario, i.e., write/read processes at a transponder 32 with antenna 42 will not be disturbed or affected by the adjacent transponder 32 of the next transport container 2.

Figure 6B shows the case in which the second transport container 2 - seen from the left - is placed on conveyor 40 in a position rotated by 180E in comparison with the position shown in Figure 6A. Separation gap T between the two transponders is now even larger and there exists no risk of disturbance or cross interference.

Figure 6C shows the case in which the first transport container 2 - as seen in the transport direction - shown in Figure 6A is located on conveyor 40 in a position rotated by 180E. In this manner, the two front sides 12, in which vicinity transponders 32 are located, are immediately adjacent to each other and the separation gap T is thus substantially smaller than that shown in Figures 6A or 6B. Nonetheless, the arrangement shown in Figure 6C still ensures a safe and trouble-free operation of transponder 32 since the gap between the front side of transponder 32 facing corner 26 and the adjacent corner 26 is at least 18 mm in this arrangement. Accordingly and as shown in Figure 6C, a minimum gap T of 36 mm between the two transponders 32 is ensured when front sides 12 of two adjacent transport containers 2 are immediately adjacent to each other as seen in the longitudinal direction of conveyor 40. Furthermore and as seen in the longitudinal direction of conveyor 40, antenna 42 is located at a distance of 160 mm from antenna 42'. This has the following effect: when transport containers 2 are transported in the direction of the arrow shown in Figure 6C, transponder 32 of transport container 2 shown on the right side in Figure 6C is scanned first by antenna 42. Based on the gap between the two antennas, transponder 32 of the front transport container 2 still maintains a sufficient gap from its assigned antenna 42' as well as from the just-activated antenna 42. During the further transport of transport container 2 on conveyor 40, transponder 32 of transport container 2 shown in the left or front position in Figure 6C enters the sending and receiving area of its antenna 42' that is indicated in Figure 6C with the reference number 44.

With respect to more detailed technical data of applicable reading devices and corresponding antennas, reference is hereby made explicitly to the respective data sheets 10-06-020 (02/92) and 10-08-002 (02/92) issued by Texas Instruments, in which reading devices and antennas that can be used with the above-mentioned transponder type RI-TRP-RB2B made by the same manufacturer are specified.

To ensure a sufficient separation gap between stacked transport containers 2 as shown in Figure 5, the gap between the side wall edge strip 14 and edge strip 16 is determined such that the vertical gap between the longitudinal center axis of two transponders 32 in the respective edge strips 16 varies between at least 40 mm and approximately 100 mm, with the preferred gap being approximately 70 mm, when two or more transport containers 2 are stacked by nesting them as shown in Figure 5.

In accordance with the invention, transponder 32 is freely programmable. This means that the respective user of transport container 2 can enter individual data into the transponder by way of the write/read device or its antenna, i.e., in addition to the transponder identification, such as a current number or similar programmed at the facility of the transponder manufacturer. Said individual data can then be retrieved, fully or partly deleted, changed or rearranged at any time. The memory module installed in transponder 32 has a memory capacity of 19 memory pages and these 19 memory pages are available for the writing and reading of individual data with a simultaneous blocking or partial blocking of these data with pass codes for unauthorized persons. To activate a transponder 32 or to write and/or read data, the portable or stationary write-read device emits HF pulses that can reach all transponders 32 located within the range of the device. The transponder 32 addressed by its respective identification number reacts to the HF pulses emitted by the write-read device, in which case the energy required for its operation is taken from the sending energy of the write-read device.

The use of such freely programmable transponders in transport container 2 in accordance with the invention yields substantial advantages, particularly when using transport container 2 as stacking pack boxes for pharmaceutical products. Due to the large memory capacity exhibited by the freely programmable transponders 32, it is possible to store not only specific data relating to transport container 2, such as running identification numbers, pool operators or owners of transport container 2, but also data relating to the content of transport container 2. Many application possibilities and advantages exist in the area of pharmaceutical trade.

It is possible, for example, to have the drug manufacturer program transponder 32 prior to shipping the stacking pack box filled with drugs or similar to the middleman or distributor. Upon arrival at the middleman or distributor, transport containers 2 delivered by the drug manufacturer are scanned with a portable reading device while still stacked on the transport pallet or they may be loaded onto conveyor 40, where they will pass through the sending and receiving ranges of antennas 42 and 42'. Accordingly, each transport container 2 passing antennas 42 or 42' identifies first itself and then its content. The transport container and content data transmitted in that manner from transponder 32 to antenna 42 or 42' can be processed with the help of a computer. It is possible, for example, to access the individual antennas 42 and 42' with a central computer, using a multiplex mode. By way of exchangeable IC cards or similar, data that need to be read or transferred by portable reading devices can be transferred to the central computer or received by it from time to time. The individual transport containers 2 or their contents are then sorted again, rearranged and partly repacked according to the orders received from pharmacies, drug stores or hospitals.

In that connection, it may be necessary to use transport containers that have been intermediately stored by the middleman or the distributor with their content. When certain products are removed from such an intermediately stored transport container, the removed product can be entered in the respective transponder 32 of transport container 2 with the help of a portable write-read device, possibly with the prior entering of a pass code. The portable write-read device is connected to a central computer and it is thus possible to continuously monitor the actual inventory of drugs and similar in the intermediate storage facility and to reorder products when required.

Prior to leaving the middleman or distributor facility, transport containers 2 with their contents arranged according to the orders received can be labeled again by way of the respective transponder 32, i.e., it is possible to store customer data, order numbers, content of the respective transport container, name of the person that handled the transport container or its content, date and similar data on the respective transponder 32. Among other purposes, these data serve to maintain a quality and safety control system and to better track the shipping of the transport container. When received by the customer, said customer can retrieve the content of the transponder memory with another write-read device and verify that his order was fully processed and/or that there are discrepancies between the container content and the related transponder data; this may occur, for example, when drugs or goods have been stolen from the transport container or lost in another manner.

The empty transport containers can then be stacked as shown in Figure 5 and are then - in this space-saving arrangement - sent to the next drug manufacturer or returned to the middleman or distributor. Since the gap between edge strip 16 and side wall edge strip 14 is determined such that a safety gap of at least 44 mm, and preferably of approximately 70 mm, is maintained even for stacked transport

containers as shown in Figure 5, data stored in transponders can be read individually and trouble-free even for transport containers stacked as shown in Figure 5.

The description given so-far shows that the use of a freely programmable transponder in a transport container offers substantial advantages for a faster and more efficient handling of the goods at the middleman or distributor, particularly for pharmaceutical products, and also yields a substantially improved quality and safety control system. Furthermore, inventory can be monitored and updated in a simpler manner and the shipping path of the transport containers is easier to monitor. In the case of rush orders, it is possible to find the transport container or containers that contain the required drug or similar without having to read complicated labels and to remove cover 20 to visually check the content, since transport containers arriving at the middleman or distributor identify themselves automatically regarding their own data and contents.

A number of modifications and changes are possible within the scope of this invention; this will be addressed by way of short descriptions.

The design of edge strip 16 as well as of side wall receiving strip 14 is not restricted to the continuous form shown in the figures. Since edge strip 16 or side wall receiving strip 14 basically serve as a holding device to handle transport containers 2 or as an interacting support area when stacking the containers as shown in Figure 5, it would be sufficient to provide only a section or segment of edge strip 16 and of side wall receiving strip 14. Accordingly, one may delete edge strip 16 and side wall receiving strip 14 in the area of front sides 10 and 12. However, the above-described design of edge strip 16 and of side wall receiving strip 14 is preferred, since they may serve other functions in that form. Among other purposes, they serve to accommodate an all-around grasping by lifting devices, conveyor units or robots, to permit weighing without a pallet and an easy exchange of pallets for stacked transport containers in clean rooms.

Furthermore, it is not absolutely necessary to design longitudinal sides 6 and 8 or front sides 10 and 12 as three step-like wall sections that slope inward from the edge to bottom 4. Longitudinal sides 6 and 8 or front sides 10 and 12 may also consist of smooth walls.

Furthermore, transport container 2 may be square, although a rectangular shape is more advantageous, because this permits only the arrangements that are shown in Figures 6A through 6C for conveyor 40 and that can be managed without problems and with the two provided antennas 42 and 42' with respect to the required separation gap between two adjacent transponders 32.

As indicated earlier, the gap between the transponder front that faces the corner and this adjacent corner is at least 18 mm for a rectangular or square transport container form with distinct corners. When the corners of the transport container are more or less rounded for reasons of ergonomics and/or manufacture, the gap between the transponder front and the extension of the bordering cross walls of the transport container or the plane of the side that has no transponder and borders the corner is 18 mm.

In any case, fast and direct data exchange is possible in a very cost-effective manner for the sender and recipient of the transport container due to the secure assignment possibilities of electronic data to the transport container in accordance with the invention.

Patent claims

1. A transport container, particularly a stacking pack box for pharmaceutical products, with a closed and basically rectangular bottom section (4), vertical sides (6, 8, 10, 12) and a top cover (20) that closes the transport container (2),

   characterized by

   a freely programmable transponder (32) arranged in an edge strip (16) of one side (6, 8, 10, 12) of the transport container (2) adjacent to - yet at a distance from - a corner (26) of the transport container (2).

2. A transport container in accordance with claim 1, characterized by the fact that the edge strip (16) has an open underside and the transponder (32) can be pushed from the open bottom into the edge strip (16).

3. A transport container in accordance with claim 1, characterized by the fact that the edge strip (16) exhibits a closed and hollow cross section and that the transponder (32) can be installed in the hollow section by inserting it through a lateral hole.

4. A transport container in accordance with one of claims 1 through 3, characterized by the fact that the gap between the longitudinal center axis of the transponder (32) and the usable inside volume (38) of the transport container is at least 7 mm.

5. A transport container in accordance with one of claims 1 through 4, characterized by the fact that the vertical gap between the longitudinal center axis of the transponder (32) and the top edge of the edge strip (16) shall not exceed 7.5 mm.

6. A transport container in accordance with one of claims 1 through 5, characterized by the fact that two or more of these transport containers (2) can be partly nested into each other and can thus be stacked.

7. A transport container in accordance with claim 6, characterized by the fact that the vertical gap between the longitudinal center axis of transponders (32) arranged in two immediately adjacent transport containers (2) varies between at least 40 mm and approximately 100 mm, with the preferred gap being 70 mm, for stacked transport containers (2).

8. A transport container in accordance with one of claims 1 through 7, characterized by the fact that the gap between the transponder front facing in the direction of its adjacent corner (26) and this adjacent corner (26) or an extension of the bordering cross wall of the transport container is at least 18 mm.

9. A transport container in accordance with one of claims 1 through 8, characterized by the fact that the transponder (32) is arranged at a longitudinal side (8).

10. A transport container in accordance with one of claims 1 through 9, characterized by the fact that several transponders (32) are arranged in the edge strip (16).

Fig. 1

Fig. 2

Fig.3A

Fig. 3B

Fig. 4

Fig. 5

Fig. 6A

Fig. 6B

Fig. 6C

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